

5.3

Exploring Exponential Equations

In this unit, you have studied situations that show patterns of exponential growth or exponential decay. All of these situations are modeled by equations of the form $y = a(b^x)$, where a is the starting value and b is the growth or decay factor.

Problem 5.3 Exploring Exponential Equations

You can use your graphing calculator to explore how the values of a and b affect the graph of $y = a(b^x)$.

- A.** First, let $a = 1$ and explore how the value of b affects the graph of $y = b^x$.

- Graph these four equations in the same window. Use window settings that show x -values from -5 to 5 and y -values from -5 to 20 . Record your observations.

$$y = 1.25^x \quad y = 1.5^x \quad y = 1.75^x \quad y = 2^x$$

- Next, graph these three equations in the same window. Use window settings that show $-5 \leq x \leq 5$ and $-1 \leq y \leq 2$. Record your observations.

$$y = 0.25^x \quad y = 0.5^x \quad y = 0.75^x$$

- Describe how you could predict the general shape of the graph of $y = b^x$ for a specific value of b .

- B.** Next, you will look at how the value of a affects the graph of $y = a(b^x)$. You will need to adjust the window settings as you work. Graph each set of equations in the same window. Record your observations for each set.

- $y = 2(2^x)$ $y = 3(2^x)$ $y = 4(2^x)$
- $y = 2(1.5^x)$ $y = 3(1.5^x)$ $y = 4(1.5^x)$
- $y = 2(0.5^x)$ $y = 3(0.5^x)$ $y = 4(0.5^x)$

- Describe how the value of a affects the graph of an equation of the form $y = a(b^x)$.

ACE Homework starts on page 64.

